

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1-36 (cancelled).

37. (previously presented) A method for providing an improved surface of a III-V semiconductor at crystal mirror facets for laser cavities, comprising:

providing a wafer comprising a layer of III-V semiconductor material;

in an ambient atmosphere comprising at least one of air, dry air, and dry nitrogen ambients, cleaving the wafer to produce a chip having at least one crystal mirror facet;

removing oxides and other surface contaminants from the at least one crystal mirror facet by dry etching the at least one crystal mirror facet in a vacuum; and

after the dry etching step, growing a native nitride layer on the at least one crystal mirror facet;

wherein the native nitride layer comprises native nitride compounds, each native nitride compound comprising a group III element and nitrogen; and

wherein the nitrogen in the native nitride compounds was supplied during the growing step, and all other atoms in the

native nitride compounds were present in the at least one crystal mirror facet prior to the growing step.

38. (previously presented) The method of claim 37, wherein the native nitride compounds are selected from the group consisting of GaN, InN, AlN, AlGaN, and InAsN.

39. (previously presented) The method of claim 37, wherein each native nitride compound consists of at least one group III element and nitrogen.

40. (previously presented) The method of claim 39, wherein each native nitride compound consists of one group III element and nitrogen.

41. (previously presented) The method of claim 37, wherein said all other atoms in the native nitride compounds were present in the layer of III-V semiconductor material prior to the cleaving step.

42. (previously presented) The method of claim 37, comprising the further step of adding a passivation layer in direct contact with the native nitride layer.

43. (new) The method of claim 37, wherein the removing step comprises using a substance assisted plasma comprising at least one substance from the group consisting of nitrogen, hydrogen, argon, halogen compounds, and hydrocarbon gases.

44. (new) The method of claim 43, further comprising the step of passivating the at least one facet using a nitrogen assisted plasma.

45. (new) The method of claim 43, wherein the dry etching is performed with a nitrogen assisted plasma.

46. (new) The method of claim 45, wherein the nitrogen plasma comprises nitrogen ions in atomic form.

47. (new) The method of claim 46, wherein the nitrogen plasma comprises nitrogen ions in neutral atomic form.

48. (new) The method of claim 45, wherein the nitrogen plasma comprises nitrogen ions in molecular form.

49. (new) The method of claim 43, wherein the dry etching is performed with plasma using a mixture of nitrogen and another gas, and wherein during the dry etching step, the other gas is gradually replaced by nitrogen until only nitrogen plasma remains.

50. (new) The method of claim 43, wherein the dry etching is performed with plasma using a gas that is free of nitrogen, and wherein during the dry etching step, the gas that is free of nitrogen is gradually replaced by nitrogen until only nitrogen plasma remains.

51. (new) The method of claim 43, wherein the substance is argon.

52. (new) The method of claim 37, wherein the crystal mirror facets comprise GaAlAs-InGaAs surfaces which further comprise at least one of Sb and Se.

53. (new) The method of claim 43, wherein an interface between the mirror facets and the grown nitride layer is gradual.

54. (new) The method of claim 43, wherein the growing step comprises using plasma comprising nitrogen with an extracted beam so that the native nitride layer comprises at least one of AlN, GaN, InN, and InAsN.

55. (new) The method of claim 37, further comprising the step of additional deposition of a thin nitride film using reactive plasma in combination with nitrogen and at least one element from the periodic table groups 2b, 3a, 4a, and 5a.

56. (new) The method of claim 43, comprising the further step of adding at least one further film that reduces interface surface recombination prior to mirror coating.

57. (new) The method of claim 37, further comprising enhancing smooth surface morphology during the etching step by using a specific energy range of 0 to 2000 eV in combination with alternate incident beam angles from 0° to 90° from a normal incident angle.